

# The International Journal of Frontier Sciences

## Eye Makeup Use, Adoption of Makeup Safety Guidelines among Women and Its Association with Ocular Surface Disease Index (OSDI): Analytical Cross-Sectional Study

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### Abstract:

**Objectives:** To assess the frequency of eye makeup use among female doctors and its association with ocular surface disease Index (OSDI).

**Study Design:** Analytical Cross-Sectional Study

**Place and Duration of Study:** It was conducted from Jan 2018 to May 2018 at a tertiary care hospital Rawalpindi.

**Materials and Methods:** Sample size calculated using WHO sample size calculator was 272 with margin of error 5% and confidence level of 95%. A WHO Standardized OSDI Questionnaire was used to assess for the severity of ocular surface disease and frequency of application of eye makeup. Females were also inquired about adoption of safety guidelines while applying and removing eye makeup. Results were displayed as frequencies and percentages and Chi Square test was applied to assess statistical significance among frequency of makeup use and severity of ocular symptoms.

**Results:** Frequency of Eye makeup use as stated by the participants was less than three times among 37% and it was more than three times a week among 63% participants. Once a week users were only 24.7%. Among users it was found that majority 49.3% had normal scores while 55(24.2%) had mild disease, 11.5% had moderate disease and only 15% had severe disease. Some questions were added in questionnaire to assess the safety practices regarding eye makeup use. It was quite satisfactory to know that 73.1% of the participants do check expiry date of products before use, don't share their products with others 62.1% and take off makeup before going to sleep 78.4%. However, the situation was quite opposite in some other practices as only 42.3% do patch test before applying makeup and 34.8% check constituents before purchasing the make up as to some of the constituents they might be sensitive.

**Conclusion:** This study shows the utilization of eye make-up is extensive and related to the perception of ocular discomfort. With such widespread use of these products, more research is needed to assess the effect on the ocular surface and tear film, which can be underestimated.

**Keywords:** Ocular Surface Disease Index (OSDI), Dry Eye Syndrome (DES)

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Submitted: May 7, 2019

Accepted: June 10, 2019

Published Online: July 10, 2019

doi: 10.5281/zenodo.3270665

How to cite this: Maroof, S., Mehmood, H., Khurshied, S., Bukhari, S.K., Shabbir, M.B., Malik, K., Shan, K. and Zameer, S. 2019. Eye Makeup Use, Adoption of Makeup Safety Guidelines among Women and Its Association with Ocular Surface Disease Index (OSDI): Analytical Cross-Sectional Study. Int J Front Sci, 3(2), 78-83.

**Introduction:**

Since ancient times eye makeup has been applied to enhance attractiveness and beauty (1) and this practice is still going on in present time's world over among all females of different age groups. Using cosmetics elevates the psychological wellbeing and confidence of women as well. In this regard various cosmetics are in use like eyeliner, mascara, eye shadow or a combination of all these (2)

However, at the same time eye cosmetic application exposes eyes to various range of discomforts, irritation in eyes leading to watering or even to vision loss in extensive injuries. The principally affected parts of the eye in this case are referred to as the 'Ocular Surface System' is principally affected parts of the eye due to cosmetic use as this system is exposed to chemical agents and bacterial contaminants in makeup products and makeup applicator brushes (3). This leads to various allergies, redness and blurring of vision. Advanced cases may present with blepharitis, keratitis, conjunctivitis and dry eye disease (DED)

Dry Eye Disease has a major impact on vision and hence quality of life. Dry Eye Disease results in a variety of symptoms which together make up chronic pain syndrome with varying degrees of ocular surface discomfort. If we probe into the possible causes to eye diseases related to cosmetic application it may be due to application, frequency of use and chemical composition of the product. Among these the most important aspect is sharing cosmetics of testers available in market being used by thousands of customers and hence vehicle for transmission of pathogens (4) and sharing cosmetics with those already suffering from ocular infection could be source of infection spread. Another important aspect is using

products that have expired because of biochemical changes in their composition or microbial infestation. Among these mascara and kohl are most common products most commonly used even when expired (5)

Lack of proper removal of makeup because of lead, arsenic and chromium content is also responsible for ocular allergies and diseases (6) (7) Due to advances in health and promotion of preventive behaviours, ocular health has gained much importance to enhance ocular performance, cosmetics and ocular comfort. However, some individuals even with certain symptoms may not recognize them and keep on living with them considering it normal presentation of their age (8) (9)

**Material and Methods:**

Analytical cross-sectional study was conducted among female doctors working at renowned tertiary care hospital of Rawalpindi from Jan 2018 till May 2018. Using WHO sample size calculator, sample size was calculated to be 272 with confidence level (CL) of 95%, Anticipated population proportion (P) of 0.82 and margin of error 5%. Purposive sampling was used to enrol female doctors (house officers, specialists or Medical officers) who use at least one kind of eye makeup after their informed verbal consent. Participants with history of ocular surgery, using any kind of ophthalmic ointments or drops, previously diagnosed as DES or having nasolacrimal duct obstruction were excluded from the study. A WHO standardized, closed ended questionnaire (OSDI) was used to collect data. The OSDI contains three subscales: ocular discomfort symptoms, vision-related function, and environmental triggers, which are all queried by three or more questions which direct patients to their experience over the past

week. More specifically, the OSDI includes three items related to ocular discomfort (feeling sensitive to light, gritty, and painful or sore eyes) and six questions related to visual disturbance (blurred vision or poor vision) or visual function (problems reading, driving at night, working with a computer, or watching TV), and three questions related to possible symptom triggers (windy conditions, low humidity, or areas that are air-conditioned). Questionnaire consisted of 3 parts comprising of total 12 questions. Each question is scored on Likert scale of 0 to 4. Total score is obtained by adding the individual scores. The total number of questions answered out of 12 questions are also noted for each participant. Then the sum of scores for all questions answered and number of questions answered were compared with standard available chart which helps us to find out where an individual participants score falls and we compared it with corresponding shade of red to find out whether the score indicates normal, mild, moderate or severe dry eye disease. Qualitative data was presented as frequencies and percentages. Quantitative data such as age was presented as mean and standard deviation. Chi square test of significance was used to find association between frequency of eye makeup use and Ocular Surface Disease. A p-value of  $< 0.05$  was taken as statistically significant. Ethical review committee was approached for permission.

### Results:

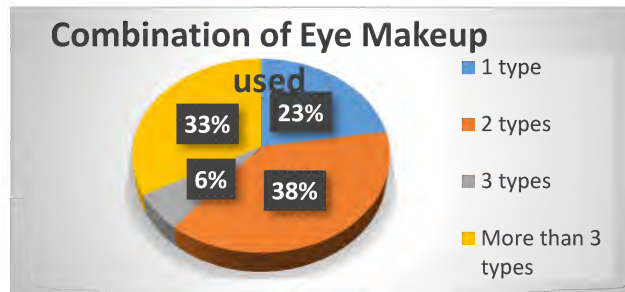
Out of the 272 participants 121 were married (53.3%) while remaining 106 (46.7%) were unmarried. Among all participants the predominant designation was post-graduate trainees or medical officers 103 (45.4%) followed by house officers 76 (33.5%) and

consultants 48 (21.1%). H/o contact lens use was among 38 (16.7%) participants and 43 (18.9%) had past h/o any kind of eye allergy. Demographic characteristics are given in Table 1.

**Table 1: Demographic variables of the participants**

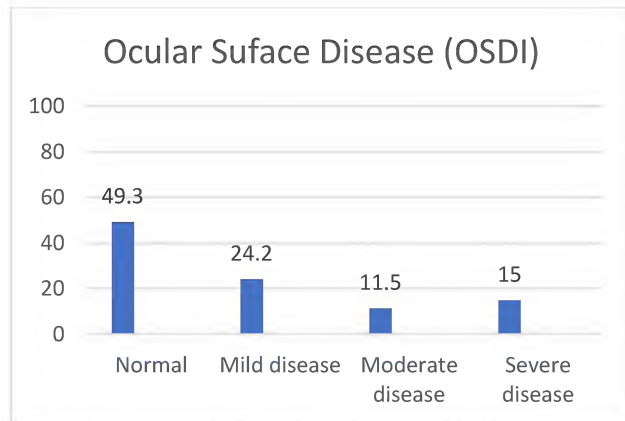
Variable		Frequency (n)	Percentage (%)
Marital Status	Married	121	53.3
	Unmarried	106	46.7
	House Officers	76	33.5
	PG Trainees/ Medical Officers	103	45.4
	Consultants	48	21.1
Contact lens Use	Yes	38	16.7
	No	189	83.3
Past h/o any kind of eye allergy	Yes	43	18.9
	No	184	81.1

Frequency of Eye makeup use as stated by the participants was less than three times among 84(37%) and it was more than three times a week among 143(63%) participants. Once a week users were only 56(24.7%). When the participants were inquired about various types of eye makeup combinations they use majority 87(38.3%) used two types like eyeliner and mascara while 75(33%) used more than three types like eyeliner, mascara and eye shades and kajol. Only 51(22.5%) reported use of only eyeliner as their only choice for eye makeup shown in figure 1.



**Figure 1: Combinations of Eye makeups being use**

When the sum of scores for all 12 questions scored on Likert scale was obtained for individual participants it was found that majority 112(49.3%) had normal scores while 55(24.2%) had mild disease, 26(11.5%) had moderate disease and only 34 (15%) had severe disease as shown in figure 2.



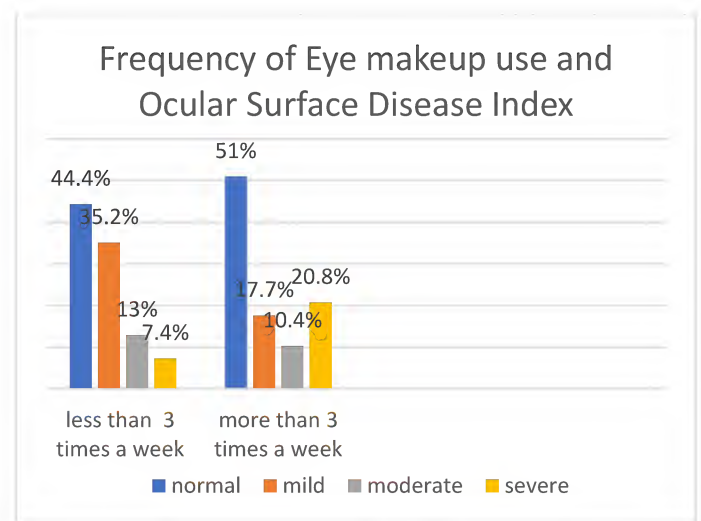
**Figure 2: Ocular Surface Disease Index**

There was significant association between frequency of eye makeup use and Ocular Surface Disease Index (OSDI)  $p < 0.05$  shown in Table 2.

Participants who used makeup more than 3 times a week 51% of them had normal ocular surface while 20.8 % of them suffered from severe disease. While 44.4% of the people who used makeup less than 3 times a week had a normal ocular surface whereas 7.4 % of them suffered from severe disease. As shown in Figure 3.

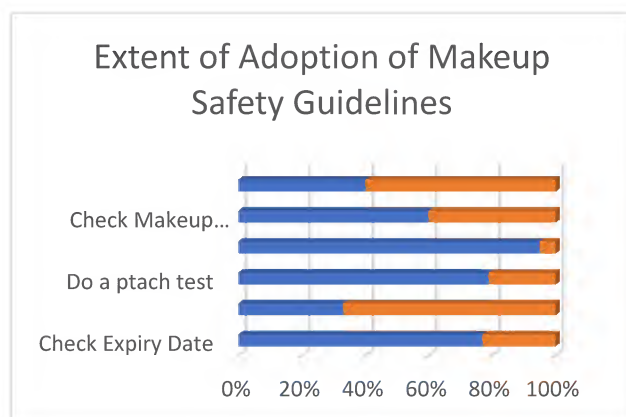
**Table 2: Association of Eye Makeup use with Ocular Surface disease (OSD)**

Frequency of Eye Makeup use	Ocular Surface Disease				p-value
	Normal	Mild	Moderate	Severe	
Less than three times / Week	37	29	11	7	$X^2=10.834$ $p=0.013$
More than three times / Week	75	26	15	27	



**Figure 3: Frequency of Eye Makeup use and Ocular Surface Disease**

Some questions were added in questionnaire to assess the safety practices regarding eye makeup use. It was quite satisfactory to know that 166(73.1%) of the participants do check expiry date of products before use, don't share their products with others 141 (62.1%) and take off makeup before going to sleep 178 (78.4%). However the situation was quite opposite in some other practices as only 96(42.3%) do patch test before applying makeup and 79(34.8%) check constituents before purchasing the make up as to some of the constituents they might be sensitive shown in figure 4.



**Figure 4: Adoption of Makeup Safety Guidelines among participants**

### Discussion:

In our study the OSDI scores are different among those who used makeup less than three times a week and those who use eye makeup more than three times a week ( $p < 0.05$ ) however in a study conducted at Cardiff University(10) OSDI scores of cosmetics users were similar to non-users ( $p = 0.083$ )

Our participants had a perceived reduction in comfort 58.2% which is similar to study conducted by Alison et al (11) where results were collected from a survey using Ocular Surface Disease Index (OSDI) score and reported 65% reduction in comfort with eye makeup use. In a study conducted to assess the migration of cosmetics into tear film it was observed to occur within 5-10 minutes post application (12) while our participants reported similar facts. So an important aspect of testing safety of cosmetics and cosmetic products is its ocular irritation potential (13) for which the participants in our study were asked and it was found that majority (79%) do a patch test before application and 60% check for the constituents of the products.

### Conclusions:

This study shows the utilization of eye make-up is extensive and related to the perception

of ocular discomfort. With such widespread use of these products, more research is needed to assess the effect on the ocular surface and tear film, which can be underestimated.

### Recommendations:

To decrease the incidence of ocular disease due to eye makeup

1. Eye makeup should be avoided as much as possible.
2. Eyes should be properly cleansed before applying makeup and while removing it.
3. Eye makeup of reputable brands should be used.
4. Makeup should be kept in a clean environment to prevent it from getting contaminated.

**Conflict of Interest:** This study has no conflict of interest to declare by any author.

**Disclosure:** None

**Human and Animal Rights:** No rights violated

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